



Specialty Steel

Safety Data Sheet (SDS)

Section 1 – Identification

1(a) Product Identifier used on Label: Specialty Steel

1(b) Other means of identification: Austenitic Grades, Ferrite & Martensitic Grades, Precipitation Hardening Grades, High Temp Grades, CrNiMn Grades, Low Alloy (VAR) Grades, Premium VIM Melt, Tool Steel Grades (Refer to Section 16)

1(c) Recommended use of the chemical and restrictions on use: None - Use in a manner in which this product is intended and appropriate.

1(d) Name, address, and telephone number:

Universal Stainless & Alloy Products, Inc. Phone: (412) 257-7600
 600 Mayer Street
 Bridgeville, PA 15017-2777

1(e) Emergency Phone Number: (412) 257-7600

Section 2 – Hazard(s) Identification

2(a) Classification of the chemical: Specialty Steel is considered an article under Reach regulation (REACH REGULATION (EC) No 1907/2006) and is not subject to classification under CLP regulation (REGULATION (EC) No 1272/2008). However, Specialty Steel is not exempt as an article under OSHA's Hazard Communication Standard (29 CFR 1910.1200) due to its downstream use, thus this product is considered a mixture and a hazardous material. Therefore, the categories of Health Hazards as defined in "GLOBALLY HARMONIZED SYSTEM OF CLASSIFICATION AND LABELING OF CHEMICALS (GHS), Third revised edition ST/SG/AC.10/30/Rev. 3" United Nations, New York and Geneva, 2009 have been evaluated. Refer to Section 3, 8 and 11 for additional information.

2(b) Signal word, hazard statement(s), symbols and precautionary statement(s):

| Hazard Symbol | Hazard Classification | Signal Word | Hazard Statement(s) |
|---------------|---|-------------|--|
| | Carcinogenicity - 1B | DANGER | May cause cancer. |
| | Reproductive Toxicity - 2 | | Suspected of damaging fertility or the unborn child. |
| | Single Target Organ Toxicity (STOT) Repeat Exposure - 1 | | Causes damage to lungs and central nervous system through prolonged or repeated inhalation exposure. |
| | Respiratory Sensitization - 1B | DANGER | May cause allergy or asthma symptoms or breathing difficulties if inhaled. |
| | Acute Toxicity-Oral/Inhalation - 4 | | Harmful if swallowed or inhaled. |
| | Skin Sensitization - 1 | | May cause an allergic skin reaction. |
| | Single Target Organ Toxicity (STOT) Repeat Exposure - 3 | DANGER | May cause respiratory irritation. |
| | Eye Irritation - 2B | | Causes eye irritation. |

Precautionary Statement(s):

| Prevention | Response | Storage/Disposal |
|---|---|--|
| Do not breathe dusts or fumes. In case of inadequate ventilation, wear respiratory protection. Wear protective gloves / protective clothing / eye protection / face protection. Contaminated work clothing must not be allowed out of the workplace. Wash thoroughly after handling. Obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Use only outdoors or in a well ventilated area. Do not eat, drink or smoke when using this product. In case of inadequate ventilation, wear respiratory protection. | If exposed, concerned or feel unwell: Get medical advice/attention. If inhaled: Remove person to fresh air and keep comfortable for breathing. If you feel unwell or are experiencing respiratory symptoms: Call a poison center or doctor/physician. If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If eye irritation persists: Get medical advice/attention. If on skin: Wash with plenty of water. If irritation or rash occurs: Get medical advice/attention. Take off and wash contaminated clothing before reuse. If swallowed: Call a poison center or doctor/physician if you feel unwell. Rinse mouth. | Dispose of contents in accordance with federal, state and local regulations. Store locked up. |

2(c) Hazards not otherwise classified: None Known

2(d) Unknown acute toxicity statement (mixture): None Known

Section 3 – Composition/Information on Ingredients

3(a-c) Chemical name, common name (synonyms), CAS number and other identifiers, and concentration:

| Chemical Name | CAS Number | EC Number | % weight |
|---------------|------------|-----------|-----------|
| Iron | 7439-89-6 | 231-096-4 | 0-98 |
| Nickel | 7440-02-0 | 231-111-4 | 0.05-60.5 |
| Cobalt | 7440-48-4 | 231-158-0 | 0.6-17.65 |
| Copper | 7440-50-8 | 231-159-6 | 0.03-6.5 |

Section 3 – Composition/Information on Ingredients (continued)

3(a-c) Chemical name, common name (synonyms), CAS number and other identifiers, and concentration (continued):

| Chemical Name | CAS Number | EC Number | % weight |
|---------------|------------|-----------|------------|
| Manganese | 7439-96-5 | 231-105-1 | 0.1-17.5 |
| Aluminum | 7429-90-5 | 231-072-3 | 0.01-3.3 |
| Nitrogen | 7727-37-9 | 231-783-9 | 0.005-2.45 |
| Sulfur | 7704-34-9 | 231-722-6 | 0.001-2.45 |

Chemical Identity of Substances Not Regulated under 29 CFR 1910.1200 (Hazard Communication Standard), but offered as information for grade(s):

| Chemical Name | CAS Number | EC Number | % weight |
|---------------|------------|-----------|------------|
| Chromium | 7440-47-3 | 231-157-5 | 0.1-35 |
| Molybdenum | 7439-98-7 | 231-107-2 | 0.01-13.5 |
| Tungsten | 7440-33-7 | 231-143-9 | 0.2-22.85 |
| Silicon | 7440-21-3 | 231-130-8 | 0.05-7.5 |
| Carbon | 7440-44-0 | 231-153-3 | 0.01-4.8 |
| Phosphorous | 7723-14-0 | 231-768-7 | 0.015-2.15 |
| Titanium | 7440-32-6 | 231-142-3 | 0.02-5.1 |
| Niobium | 7440-03-1 | 231-113-5 | 0.02-8.5 |
| Vanadium | 7440-62-2 | 231-171-1 | 0.02-8 |
| Boron | 7440-42-8 | 231-151-2 | 0.001-2.02 |

EC - European Community

CAS - Chemical Abstract Service

Note: 303SE and 440FSE grades may contain trace amounts (<0.1%) of selenium, and 2304 and 13-5-2 grades may contain trace amounts (<0.1%) of tin

Section 4 – First-aid Measures

4(a) Description of necessary measures: If exposed, concerned or feel unwell: Get medical advice/attention.

- **Inhalation: Specialty Steel** as sold/shipped is not a likely form of exposure. If inhaled: Remove person to fresh air and keep comfortable for breathing. If you feel unwell or are experiencing respiratory symptoms: Call a poison center or doctor/physician
- **Eye Contact: Specialty Steel** as sold/shipped is not a likely form of exposure. If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If eye irritation persists: Get medical advice/attention.
- **Skin Contact:** If on skin: Wash with plenty of water. If irritation or rash occurs: Get medical advice/attention. Take off and wash contaminated clothing before reuse.
- **Ingestion: Specialty Steel** as sold/shipped is not a likely form of exposure. If swallowed: Call a poison center or doctor/physician if you feel unwell. Rinse mouth.

4(b) Most important symptoms/effects, acute and delayed (chronic):

- **Inhalation: Specialty Steel** as sold/shipped is not likely to present an acute or chronic health effect.
- **Eye: Specialty Steel** as sold/shipped is not likely to present an acute or chronic health effect.
- **Skin: Specialty Steel** as sold/shipped is not likely to present an acute or chronic health effect.
- **Ingestion: Specialty Steel** as sold/shipped is not likely to present an acute or chronic health effect.

However, during further processing (welding, grinding, burning, etc.) individual components may illicit an acute or chronic health effect. Refer to Section 11-Toxicological Information.

4(c) Immediate Medical Attention and Special Treatment: None Known

Section 5 – Fire-fighting Measures

5(a) Suitable (and unsuitable) Extinguishing Media: Not Applicable for Specialty Steel as sold/shipped. Use extinguishers appropriate for surrounding materials.

5(b) Specific Hazards arising from the chemical: Not Applicable for Specialty Steel as sold/shipped. When burned, toxic smoke, fume and vapor may be emitted.

5(c) Special protective equipment and precautions for fire-fighters: Self-contained NIOSH approved respiratory protection and full protective clothing should be worn when fumes and/or smoke from fire are present. Heat and flames cause emittance of acrid smoke and fumes. Do not release runoff from fire control methods to sewers or waterways. Firefighters should wear full face-piece self-contained breathing apparatus and chemical protective clothing with thermal protection. Direct water stream will scatter and spread flames and, therefore, should not be used.

Section 6 - Accidental Release Measures

6(a) Personal Precautions, Protective Equipment and Emergency Procedures: Not Applicable for Specialty Steel as sold/shipped. For spills involving finely divided particles, clean-up personnel should be protected against contact with eyes and skin. If material is in a dry state, avoid inhalation of dust.



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Section 6 - Accidental Release Measures

6(b) Methods and materials for containment and clean up: Not Applicable for Specialty Steel as sold/shipped. Collect material in appropriate, labeled containers for recovery or disposal in accordance with federal, state, and local regulations. Follow applicable OSHA regulations (29 CFR 1910.120) and all other pertinent state and federal requirements.

Section 7 - Handling and Storage

7(a) Precautions for safe handling: Not Applicable for Specialty Steel as sold/shipped, however further processing (welding, burning, grinding, etc.) with the potential for generating high concentrations of airborne particulates should be evaluated and controlled as necessary. Wear protective gloves / protective clothing / eye protection / face protection. Contaminated work clothing must not be allowed out of the workplace. Wash thoroughly after handling. In case of inadequate ventilation, wear respiratory protection. Obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Practice good housekeeping. Do not breathe breathing metal fumes and/or dust. Do not eat, drink or smoke when using this product. Cut resistant gloves and sleeves should be worn when working with steel products.

7(b) Conditions for safe storage, including any incompatibilities: Store away from acids and incompatible materials.

Section 8 - Exposure Controls / Personal Protection

8(a) Occupational Exposure Limits (OELs): Specialty Steel as sold/shipped in its physical form does not present an inhalation, ingestion or contact hazard, nor would any of the following exposure data apply. However, operations such as burning, welding (high temperature), sawing, brazing, machining, grinding, etc may produce fumes and/or particulates. The following exposure limits are offered as reference for an experienced industrial hygienist to review:

| Ingredients | OSHA PEL ¹ | ACGIH TLV ² | NIOSH REL ³ | IDLH ⁴ |
|-------------|---|--|--|------------------------------|
| Iron | 10 mg/m ³ (as iron oxide fume) | 5.0 mg/m ³ (as iron oxide dust and fume) | 5.0 mg/m ³ (as iron oxide dust and fume) | 2,500 mg Fe/m ³ |
| Nickel | 1.0 mg/m ³ (as Ni metal & insoluble compounds) | 1.5 mg/m ³ (as inhalable fraction Ni metal) 0.2 mg/m ³ (as inhalable fraction ⁵ Ni inorganic only insoluble and soluble compounds) | 0.015 mg/m ³ (as Ni metal & insoluble and soluble compounds) | 10 mg/m ³ (as Ni) |
| Cobalt | 0.1 mg/m ³ | 0.02 mg/m ³ | 0.5 mg/m ³ | 20 mg/m ³ (as Co) |
| Copper | 0.1 mg/m ³ (as fume, Cu) 1.0 mg/m ³ (as dusts & mists, Cu) | 0.1 mg/m ³ (as fume) 1.0 mg/m ³ (as dusts & mists, Cu) | 1.0 mg/m ³ (as dusts & mists) | 100 mg Cu/m ³ |
| Manganese | (C) 5.0 mg/m ³ (as Fume & Mn compounds) | 0.2 mg/m ³ | (C) 5.0 mg/m ³ 1.0 mg/m ³ (as fume) (STEL) 3.0 mg/m ³ | 500 mg Mn/m ³ |
| Aluminum | 15 mg/m ³ (as total dust, PNOR) 5.0 mg/m ³ (as respirable fraction, PNOR) | 10 mg/m ³ (as metal dust) 5.0 mg/m ³ (as welding fume) | 10 mg/m ³ (as total dust) 5.0 mg/m ³ (as respirable dust) | NE |
| Nitrogen | NE | NE | NE | NE |
| Sulfur | 15 mg/m ³ (total dust, PNOR ⁵) 5.0 mg/m ³ (as respirable fraction, PNOR) | 10 mg/m ³ (as inhalable fraction ⁶ , PNOS ⁷) 3.0 mg/m ³ (as respirable fraction ⁸ , PNOS) | NE | NE |

NE - None Established

1. OSHA Permissible Exposure Limits (PELs) are 8-hour TWA (time-weighted average) concentrations unless otherwise noted. A (C) designation denotes a ceiling limit, which should not be exceeded during any part of the working exposure unless otherwise noted. A Peak is defined as the acceptable maximum peak for a maximum duration above the ceiling concentration for an eight-hour shift. A skin notation refers to the potential significant contribution to the overall exposure by the cutaneous route, either by contact with vapors or, of probable greater significance, by direct skin contact with the substance. A Short Term Exposure Limit (STEL) is defined as a 15-minute exposure, which should not be exceeded at any time during a workday. An Action level (AL) is used by OSHA and NIOSH to express a health or physical hazard. They indicate the level of a harmful or toxic substance/activity, which requires medical surveillance, increased industrial hygiene monitoring, or biological monitoring. Action Levels are generally set at one half of the PEL but the actual level may vary from standard to standard. The intent is to identify a level at which the vast majority of randomly sampled exposures will be below the PEL.
2. Threshold Limit Values (TLV) established by the American Conference of Governmental Industrial Hygienists (ACGIH) are 8-hour TWA concentrations unless otherwise noted. A Short Term Exposure Limit (STEL) is defined as the maximum concentration to which workers can be exposed for a short period of time (15 minutes) for only four times throughout the day with at least one hour between exposures. A "skin" notation refers to the potential significant contribution to the overall exposure by the cutaneous route, either by contact with vapors or, of probable greater significance, by direct skin contact with the substance. ACGIH-TLVs are only recommended guidelines based upon consensus agreement of the membership of the ACGIH. As such, the ACGIH TLVs are for guideline use purposes and are not legal regulatory standards for compliance purposes. The TLVs are designed for use by individuals trained in the discipline of industrial hygiene relative to the evaluation of exposure to various chemical or biological substances and physical agents that may be found in the workplace.
3. The National Institute for Occupational Safety and Health Recommended Exposure Limits (NIOSH-REL) - Compendium of Policy and Statements. NIOSH, Cincinnati, OH (1992). NIOSH is the federal agency designated to conduct research relative to occupational safety and health. As is the case with ACGIH TLVs, NIOSH RELs are for guideline purposes only and as such are not legal, regulatory limits for compliance purposes.
4. The "immediately dangerous to life or health air concentration values (IDLHs)" are used by NIOSH as part of the respirator selection criteria and were first developed in the mid-1970's by NIOSH. The Documentation for Immediately Dangerous to Life or Health Concentrations (IDLHs) is a compilation of the rationale and sources of information used by NIOSH during the original determination of 387 IDLHs and their subsequent review and revision in 1994.
5. Inhalable fraction. The concentration of inhalable particulate for the application of this TLV is to be determined from the fraction passing a size-selector with the characteristics defined in the ACGIH 2015 TLVs® and BEIs® (Biological Exposure Indices) Appendix D, paragraph A.
6. PNOR (Particulates Not Otherwise Regulated). All inert or nuisance dusts, whether mineral, inorganic, or organic, not listed specifically by substance name are covered by the PNOR limit which is the same as the inert or nuisance dust limit of 15 mg/m³ for total dust and 5.0 mg/m³ for the respirable fraction (containing less than 1% crystalline silica).
7. Respirable fraction - The concentration of respirable dust for the application of this limit is to be determined from the fraction passing a size-selector with the characteristics defined in the ACGIH 2015 TLVs® and BEIs® Appendix D, paragraph C.

8(b) Appropriate Engineering Controls: Use controls as appropriate to minimize exposure to metal fumes and dusts during handling operations. Provide general or local exhaust ventilation systems to minimize airborne concentrations. Local exhaust is necessary for use in enclosed or confined spaces. Provide sufficient general/local exhaust ventilation in pattern/volume to control inhalation exposures below current exposure limits.

Section 8 - Exposure Controls / Personal Protection (continued)

8(c) Individual Protection Measures:

- Respiratory Protection:** Seek professional advice prior to respirator selection and use. Follow OSHA respirator regulations (29 CFR 1910.134) and, if necessary, use only a NIOSH-approved respirator. Select respirator based on its suitability to provide adequate worker protection for given working conditions, level of airborne contamination, and presence of sufficient oxygen. Concentration in air of the various contaminants determines the extent of respiratory protection needed. Half-face, negative-pressure, air-purifying respirator equipped with P100 filter is acceptable for concentrations up to 10 times the exposure limit. Full-face, negative-pressure, air-purifying respirator equipped with P100 filter is acceptable for concentrations up to 50 times the exposure limit. Protection by air-purifying negative-pressure and powered air respirators is limited. Use a positive-pressure-demand, full-face, supplied air respirator or self-contained breathing apparatus (SCBA) for concentrations above 50 times the exposure limit. If exposure is above the IDLH (Immediately dangerous to life or health) for any of the constituents, or there is a possibility of an uncontrolled release or exposure levels are unknown, then use a positive-demand, full-face, supplied air respirator with escape bottle or SCBA.
 - Warning!** Air-purifying respirators both negative-pressure, and powered-air do not protect workers in oxygen-deficient atmospheres.
- Eyes:** Wear appropriate eye protection to prevent eye contact. For operations which result in elevating the temperature of the product to or above its melting point or result in the generation of airborne particulates, use safety glasses to prevent eye contact. Contact lenses should not be worn where industrial exposures to this material are likely. Use safety glasses or goggles as required for welding, burning, sawing, brazing, grinding or machining operations.
- Skin:** Wear appropriate personal protective clothing to prevent skin contact. Cut resistant gloves and sleeves should be worn when working with steel products. For operations which result in elevating the temperature of the product to or above its melting point or result in the generation of airborne particulates, use protective clothing, and gloves to prevent skin contact. Protective gloves should be worn as required for welding, burning or handling operations. Contaminated work clothing must not be allowed out of the workplace.
- Other protective equipment:** An eyewash fountain and deluge shower should be readily available in the work area.

Section 9 - Physical and Chemical Properties

- | | |
|---|--|
| 9(a) Appearance (physical state, color, etc.): Solid with metallic luster 9(b) Odor: Odorless 9(c) Odor Threshold: NA 9(d) pH: NA 9(e) Melting Point/Freezing Point: ND 9(f) Initial Boiling Point and Boiling Range: ND 9(g) Flash Point: NA 9(h) Evaporation Rate: NA 9(i) Flammability (solid, gas): Non-flammable, non-combustible | 9(j) Upper/lower Flammability or Explosive Limits: NA 9(k) Vapor Pressure: ND 9(l) Vapor Density (Air = 1): NA 9(m) Relative Density: Approx. 8 9(n) Solubility(ies): Water Insoluble 9(o) Partition Coefficient n-octanol/water: ND 9(p) Auto-ignition Temperature: NA 9(q) Decomposition Temperature: ND 9(r) Viscosity: NA |
|---|--|

NA - Not Applicable



ND - Not Determined for product as a whole

Section 10 - Stability and Reactivity

- 10(a) Reactivity:** Not Determined (ND) for product in a solid form. Do not use water on molten metal.
- 10(b) Chemical Stability:** Steel products are stable under normal storage and handling conditions.
- 10(c) Possibility of hazardous reaction:** None Known
- 10(d) Conditions to Avoid:** Storage with strong acids or calcium hypochlorite.
- 10(e) Incompatible Materials:** Will react with strong acids to form hydrogen. Iron oxide dusts in contact with calcium hypochlorite evolve oxygen and may cause an explosion.
- 10(f) Hazardous Decomposition Products:** Thermal oxidative decomposition of steel products can produce fumes containing oxides of iron and manganese as well as other alloying elements.






Section 11 - Toxicological Information

11 Information on toxicological effects: The following toxicity data has been determined for **Specialty Steel** when further processed using the information available for its components applied to the guidance on the preparation of an SDS under the GHS requirements of OSHA and the EU CPL:

| Hazard Classification | Hazard Category | | Hazard Symbols | Signal Word | Hazard Statement |
|---|-----------------|-----------------|---|----------------|--------------------------------------|
| | EU | OSHA | | | |
| Acute Toxicity Hazard (covers Categories 1-4) | NA* | 4 ^a |  | Warning | Harmful if swallowed or inhaled. |
| Eye Damage/Irritation (covers Categories 1, 2A & 2B) | NA* | 2B ^c | NA | Warning | Causes eye irritation. |
| Skin/Dermal Sensitization (covers Category 1) | NA* | 1 ^d |  | Warning | May cause an allergic skin reaction. |

Section 11 - Toxicological Information (continued)

11 Information on toxicological effects (continued):

| Hazard Classification | Hazard Category | | Hazard Symbols | Signal Word | Hazard Statement |
|--|-----------------|-----------------|---|----------------|--|
| | EU | OSHA | | | |
| Respiratory Sensitization (covers Category 1A & 1B) | NA* | 1B ^d |  | Warning | May cause allergy or asthma symptoms or breathing difficulties if inhaled. |
| Carcinogenicity (covers Categories 1A, 1B and 2) | NA* | 1B ^g |  | Warning | May cause cancer. |
| Toxic Reproduction (covers Categories 1A, 1B and 2) | NA* | 2 ^h |  | Warning | Suspected of damaging fertility or the unborn child. |
| Specific Target Organ Toxicity (STOT) Following Single Exposure (covers Categories 1-3) | NA* | 3 ⁱ |  | Warning | May cause respiratory irritation. |
| STOT following Repeated Exposure (covers Categories 1 and 2) | NA* | 1 ^j |  | Danger | Causes damage to lungs and central nervous system through prolonged or repeated inhalation exposure. |

* Not Applicable - Semi-formed steel products are considered articles under Reach regulation (REACH REGULATION (EC) No 1907/2006) and are not subject to classification under CLP regulation (REGULATION (EC) No 1272/2008).

Toxicological data listed below are presented regardless to classification criteria. Individual hazard classification categories where the toxicological information has met or exceeded a classification criteria threshold are listed above.

- a. No LC₅₀ or LD₅₀ has been established for **Specialty Steel**. The following data has been determined for the components:
- **Nickel:** LD₅₀ >9000 mg/kg (Oral/Rat)
 - **Copper:** Rat LD₅₀ = 481 mg/kg (REACH)
Rat LD₅₀ > 2500 mg/kg (REACH)
 - **Manganese:** Rat LD₅₀ > 2000 mg/kg (REACH)
Rat LD₅₀ > 9000 mg/kg (NLM Toxnet)
 - **Cobalt:** LD₅₀ = 10 mg/L(rat)
LD₅₀ = 500 mg/kg (Oral/Rat)
 - **Iron:** Rat LD₅₀ =98.6 g/kg (REACH)
Rat LD₅₀ =1060 mg/kg (IUCLID)
Rat LD₅₀ =984 mg/kg (IUCLID)
Rabbit LD₅₀ =890 mg/kg (IUCLID)
 - **Aluminum:** Rat LD₅₀ > 15.9 g/kg (REACH)
 - **Manganese:** Rat LD₅₀ > 2000 mg/kg (REACH)
Rat LD₅₀ > 9000 mg/kg (NLM Toxnet)
- b. No Skin (Dermal) Irritation data available for **Specialty Steel** as a mixture. The following Skin (Dermal) Irritation information was found for the components:
- **Sulfur:** Rabbit irritation, edema and erythema 4 at 72 hours all resolved by day 7. (REACH)
- c. No Eye Irritation data available for **Specialty Steel** as a mixture. The following Eye Irritation information was found for the components:
- **Iron:** Causes eye irritation.
 - **Nickel:** Slight eye irritation from particulate abrasion only.
- d. No Skin (Dermal)/respiratory Sensitization data available for **Specialty Steel** as a mixture. The following Skin (Dermal) Sensitization information was found for the components:
- **Nickel:** May cause allergic skin sensitization.
 - **Cobalt:** Skin Sensitizing In vitro mouse local lymph node. Guinea Pig Maximization test and patch test - sensitizing.
- e. No Respiratory Sensitization data available for **Specialty Steel** as a mixture or its components.
- f. No Germ Cell Mutagenicity data available for **Specialty Steel** as a mixture. The following Mutagenicity and Genotoxicity information was found for the components:
- **Nickel:** EU RAR has found positive results in vitro and in vivo but insufficient data for classification.
 - **Iron:** IUCLID has found some positive and negative findings in vitro.
- g. Carcinogenicity: IARC, NTP, and OSHA do not list **Specialty Steel** as carcinogens. The following Carcinogenicity information was found for the components:
- **Nickel and certain nickel compounds** – Group 2B - metallic nickel Group 1 - nickel compounds ACGIH confirmed human carcinogen. Nickel – EURAR Insufficient evidence to conclude carcinogenic potential in animals or humans; suspect carcinogen classification Category 2 Suspected of causing cancer.
 - **Chromium (as metal and trivalent chromium compounds)** – IARC Group 3 carcinogens, not classifiable as to their human carcinogenicity.
 - **Welding Fumes** - IARC Group 2B carcinogen, a mixture that is possibly carcinogenic to humans.
 - **Cobalt** - IARC Group 2B carcinogen possibly carcinogenic to humans. ACGIH TLV-A3.
- h. No Toxic Reproduction data available for **Specialty Steel** as a mixture. The following Toxic Reproductive information was found for the components:
- **Nickel:** Effects on fertility.
- i. No Specific Target Organ Toxicity (STOT) following a Single Exposure data available for **Specialty Steel** as a mixture. The following STOT following a Single Exposure data was found for the components:
- **Iron and Molybdenum:** Irritating to Respiratory tract.
 - **Aluminum:** Repeated exposure associated with asthma, fibrosis in lungs and encephalopathy in humans.

Section 11 - Toxicological Information (continued)

11 Information on toxicological effects (continued):

j. No Specific Target Organ Toxicity (STOT) following Repeated Exposure data was available for **Specialty Steel** as a whole. The following STOT following Repeated Exposure data was found for the components:

- **Nickel:** Rat 4 wk inhalation LOEL 4 mg/m³ Lung and Lymph node histopathology. Rat 2 yr inhalation LOEL 0.1 mg/m³ Pigment in kidney, effects on hematopoiesis spleen and bone marrow and adrenal tumor. Rat 13 Week Inhalation LOAEC 1.0 mg/m³ Lung weights, and Alveolar histopathology.
- **Copper:** Target organs affected - Skin, eyes liver, kidneys and respiratory tract.
- **Manganese:** Inhalation of metal fumes - Degenerative changes in human Brain; Behavioral: Changes in motor activity and muscle weakness (Whitlock *et al.*, 1966).
- **Aluminum:** Reviews have found chronic exposure to aluminum flake has been reported to cause pneumoconiosis in workers. Repeat oral exposure to aluminum results in decrements in neurobehavioral function and development.

The above toxicity information was determined from available scientific sources to illustrate the prevailing posture of the scientific community. The scientific resources includes: The American Conference of Governmental Industrial Hygienist (ACGIH) Documentation of the Threshold Limit Values (TLVs) and Biological Exposure indices (BEIs) with Other Worldwide Occupational Exposure Values 2014, The International Agency for Research on Cancer (IARC), The National Toxicology Program (NTP) updated documentation, the World Health Organization (WHO) and other available resources, the International Uniform Chemical Information Database (IUCSID), European Union Risk Assessment Report (EU-RAR), Concise International Chemical Assessment Documents (CICAD), European Union Scientific Committee for Occupational Exposure Limits (EU-SCOEL), Agency for Toxic Substances and Disease Registry (ATSDR), Hazardous Substance Data Bank (HSDB), and International Programme on Chemical Safety (IPCS).

The following health hazard information is provided regardless to classification criteria and is based on the individual component(s) and potential resultant components from further processing:

Acute Effects:

- **Inhalation:** Excessive exposure to high concentrations of metal dust may cause irritation to the eyes, skin and mucous membranes of the upper respiratory tract. Excessive inhalation of fumes of freshly formed metal oxide particles sized below 1.5 micrometer and usually between 0.02-0.05 micrometers from many metals can produce an acute reaction known as "metal fume fever". Symptoms consist of chills and fever (very similar to and easily confused with flu symptoms), metallic taste in the mouth, dryness and irritation of the throat followed by weakness and muscle pain. The symptoms come on in a few hours after excessive exposures and usually last from 12 to 48 hours. Long-term effects from metal fume fever have not been noted.
- **Eye:** Excessive exposure to high concentrations of metal dust may cause irritation to the eyes.
- **Skin:** Skin contact with metal dusts may cause irritation or sensitization, possibly leading to dermatitis. Skin contact with metallic fumes and dusts may cause physical abrasion.
- **Ingestion:** Ingestion of harmful amounts of this product as distributed is unlikely due to its solid insoluble form. Ingestion of metal dust may cause nausea or vomiting.

Acute Effects by component:

- **Iron and iron oxides:** Iron is harmful if swallowed, causes skin irritation, and causes eye irritation. Contact with iron oxide has been reported to cause skin irritation and serious eye damage. Particles of iron or iron compounds, which become imbedded in the eye, may cause rust stains unless removed fairly promptly.
- **Nickel and nickel oxides:** Nickel may cause allergic skin sensitization. Nickel oxide may cause an allergic skin.
- **Chromium and chromium oxides:** Hexavalent chrome causes damage to gastrointestinal tract, lung, severe skin burns and eye damage, serious eye damage, skin contact may cause an allergic skin reaction. Inhalation may cause allergic or asthmatic symptoms or breathing difficulties.
- **Cobalt and cobalt oxides:** May cause skin, eye and allergic skin reactions.
- **Copper and copper oxides:** Copper may cause allergic skin reaction. Copper oxide is harmful if swallowed, causes skin and eye irritation, and may cause an allergic skin reaction
- **Manganese and manganese oxides:** Manganese and Manganese oxide are harmful if swallowed.
- **Aluminum and aluminum oxides:** Inhalation may cause cough.
- **Nitrogen gas:** Simple asphyxiant.
- **Sulfur:** Sulfur is harmful if swallowed, causes skin and eye irritation.

Delayed (chronic) Effects by component:

- **Iron and iron oxides:** Chronic inhalation of excessive concentrations of iron oxide fumes or dusts may result in the development of a benign pneumoconiosis, called siderosis, which is observable as an X-ray change. No physical impairment of lung function has been associated with siderosis. Inhalation of excessive concentrations of ferric oxide may enhance the risk of lung cancer development in workers exposed to pulmonary carcinogens. Iron oxide is listed as a Group 3 (not classifiable) carcinogen by the International Agency for Research on Cancer (IARC).
- **Nickel and nickel oxides:** Exposure to nickel dusts and fumes can cause sensitization dermatitis, respiratory irritation, asthma, pulmonary fibrosis, edema, and may cause nasal or lung cancer in humans. Nickel causes damage to lungs through prolonged or repeated inhalation exposure. IARC lists nickel and certain nickel compounds as Group 2B carcinogens (sufficient animal data). ACGIH 2015 TLVs® and BEIs® lists insoluble nickel compounds as confirmed human carcinogens. Nickel is suspected of damaging the unborn child.
- **Chromium and chromium oxides:** The health hazards associated with exposure to chromium are dependent upon its oxidation state. The metal form (chromium as it exists in this product) is of very low toxicity. The hexavalent form is very toxic. Repeated or prolonged exposure to hexavalent chromium compounds may cause respiratory irritation, nosebleed, ulceration and perforation of the nasal septum. Industrial exposure to certain forms of hexavalent chromium has been related to an increased incidence of cancer. NTP (The National Toxicology Program) Fourth Annual report on Carcinogens cites "certain Chromium compounds" as human carcinogens. ACGIH has reviewed the toxicity data and concluded that chromium metal is not classifiable as a human carcinogen. Hexavalent chromium may cause genetic defects and is suspected of damaging the unborn child. Developmental toxicity in the mouse, suspected of damaging fertility or the unborn child.
- **Cobalt:** Chronic exposure to cobalt metal, dust, or fume may cause respiratory or dermatologic signs and symptoms. Following skin sensitization, contact with cobalt causes eruptions of dermatitis increases and on frictional surfaces of the arms, legs, and neck. Chronic respiratory exposure results in reduced lung function, increased fibrotic changes on chest X-ray, production of scanty mucoid sputum, and shortness of breath.

Section 11 - Toxicological Information (continued)

Delayed (chronic) Effects by component (continued):

- **Copper and copper oxides:** Inhalation of high concentrations of freshly formed oxide fumes and dusts of copper can cause metal fume fever. Chronic inhalation of copper dust has caused, in animals, hemolysis of the red blood cells, deposition of hemofuscin in the liver and pancreas, injury to lung cells and gastrointestinal symptoms.
- **Manganese and manganese oxides:** Chronic exposure to high concentrations of manganese fumes and dusts may adversely affect the central nervous system with symptoms including languor, sleepiness, weakness, emotional disturbances, spastic gait, mask-like facial expression and paralysis. Animal studies indicate that manganese exposure may increase susceptibility to bacterial and viral infections. Occupational overexposure (Manganese) is a progressive, disabling neurological syndrome that typically begins with relatively mild symptoms and evolves to include altered gait, fine tremor, and sometimes, psychiatric disturbances. May cause damage to lungs with repeated or prolonged exposure. Neurobehavioral alterations in worker populations exposed to MnO including: speed and coordination of motor function are especially impaired.
- **Aluminum and aluminum oxides:** Considered to be an inert or nuisance dust.
- **Nitrogen:** Not Reported/Not Classified
- **Sulfur:** Sulfur compounds, present in the fumes, may irritate the skin, eyes, lungs and gastrointestinal tract. May cause damage to the lung from prolonged or repeated exposure, Sulfur dioxide vapor is irritating to the respiratory tract and can cause lung damage with repeated or prolonged exposure.

Section 12 - Ecological Information

12(a) Ecotoxicity (aquatic & terrestrial): No Data Available for **Specialty Steel** as sold/shipped. However, individual components of the product when processed have been found to be toxic to the environment. Metal dusts may migrate into soil and groundwater and be ingested by wildlife as follows:

- **Nickel Oxide:** IUCLID found LC₅₀ in fish, invertebrates and algae > 100 mg/l.
- **Iron Oxide:** LC₅₀: >1000 mg/L; Fish 48 h-EC₅₀ > 100 mg/L (Currenta, 2008k); 96 h-LC₀ ≥ 50,000 mg/L Test substance: Bayferrox 130 red (95 – 97% Fe₂O₃; < 4% SiO₂ and Al₂O₃) (Bayer, 1989a).

12(b) Persistence & Degradability: No Data Available for **Specialty Steel** as sold/shipped or individual components.

12(c) Bioaccumulative Potential: No Data Available for **Specialty Steel** as sold/shipped or individual components.

12(d) Mobility (in soil): No data available for **Specialty Steel** as sold/shipped. However, individual components of the product have been found to be absorbed by plants from soil.

12(e) Other adverse effects: None Known

Additional Information:

Hazard Category: Not Reported

Signal Word: No Signal Word

Hazard Symbol: No Symbol

Hazard Statement: No Statement

Section 13 - Disposal Considerations

Disposal: Steel scrap should be recycled whenever possible. Product dusts and fumes from processing operations should also be recycled, or classified by a competent environmental professional and disposed of in accordance with applicable federal, state or local regulations.

Container Cleaning and Disposal: Follow applicable federal, state and local regulations. Observe safe handling precautions. European Waste Catalogue (EWC): 16-01-17 (ferrous metals), 12-01-99 (wastes not otherwise specified), 16-03-04 (off specification batches and unused products), or 15-01-04 (metallic packaging).

Please note this information is for **Specialty Steel** in its original form. Any alterations can void this information.

Section 14 - Transport Information

14 (a-g) Transportation Information:

US Department of Transportation (DOT) under 49 CFR 172.101 **does not** regulate **Specialty Steel** as a hazardous material. All federal, state, and local laws and regulations that apply to the transport of this type of material must be adhered to.

| Shipping Name: Not Applicable (NA) | Packaging Authorizations | Quantity Limitations |
|------------------------------------|--------------------------|--|
| Shipping Symbols: NA | a) Exceptions: NA | a) Passenger, Aircraft, or Railcar: NA |
| Hazard Class: NA | b) Group: NA | b) Cargo Aircraft Only: NA |
| UN No.: NA | c) Authorization: NA | Vessel Stowage Requirements |
| Packing Group: NA | | a) Vessel Stowage: NA |
| DOT/ IMO Label: NA | | b) Other: NA |
| Special Provisions (172.102): NA | | DOT Reportable Quantities: NA |

International Maritime Dangerous Goods (IMDG) and the Regulations Concerning the International Carriage of Dangerous Goods by Rail (RID) classification, packaging and shipping requirements follow the US DOT Hazardous Materials Regulation.

Section 15 - Regulatory Information (continued)

State Regulations (continued):

California Prop. 65: Contains elements known to the State of California to cause cancer or reproductive toxicity. This includes Chromium compounds, Cobalt and Nickel.

New Jersey: Contains regulated material in the following categories:

- Hazardous Substance: Nickel, Chromium, Cobalt, Copper, Manganese, Silicon, Aluminum (dust or fume) and Tungsten
- Environmental Hazard: Nickel, Chromium, Cobalt, Copper and Manganese
- Special Hazardous Substance: Chromium, Cobalt, Manganese, and Aluminum (dust or fume)

Minnesota: Nickel, Chromium, Cobalt, and Manganese

Massachusetts: Nickel (compounds), Chromium, Cobalt, Copper (compounds), Manganese (compounds), Sulfur, Nitrogen, and Aluminum (dust or fume)

Other Regulations:

WHMIS Classification (Canadian): The product, **Specialty Steel** is not listed as a whole. However individual components are listed.

| Ingredients | WHMIS Classification |
|-------------|---|
| Nickel | Skin sensitization – Category 1; Carcinogenicity – Category 2; Specific target organ toxicity – repeated exposure - Category 1 |
| Cobalt | Respiratory sensitization – Category 1; Skin sensitization – Category 1; Carcinogenicity – Category 2; Combustible dusts* |
| Manganese | Reproductive toxicity - Category 2; Specific target organ toxicity - repeated exposure - Category 1; Combustible dusts* |
| Sulfur | Flammable solids – Category 2; Skin corrosion/irritation – Category 2; Combustible dusts** |

*This product could belong to the hazard class "Combustible dust", based on various factors related to the combustibility and explosiveness of its dust, including composition, shape and size of the particles

**This product belongs to the hazard class "Combustible dust" if 5% or more by weight of its composition has a particle size < 500 µm.

This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the SDS contains all the information required by the Controlled Products Regulations.

Section 16 - Other Information

Prepared By: Universal Stainless & Alloy Products, Inc.

Revision History:

5/29/2015 - Update to OSHA HAZCOM 2012 format

7/15/2016 – Update grades and WHMIS 2015

Additional Information:

Hazardous Material Identification System (HMIS) Classification

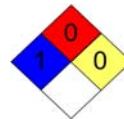
| | |
|-----------------|---|
| Health Hazard | 1 |
| Fire Hazard | 0 |
| Physical Hazard | 0 |

HEALTH= 1, Denotes possible chronic hazard if airborne dusts or fumes are generated
Irritation or minor reversible injury possible.

FIRE= 0, Materials that will not burn.

PHYSICAL HAZARD= 0, Materials that are normally stable, even under fire conditions, and will not react with water, polymerize, decompose, condense, or self-react. Non-explosives.

National Fire Protection Association (NFPA)



HEALTH = 1, Exposure could cause irritation but only minor residual injury even if no treatment is given.

FLAMMABILITY = 0, Materials that will not burn.

INSTABILITY = 0, Normally stable, even under fire exposure conditions, and are not reactive with water.

ABBREVIATIONS/ACRONYMS:

| | | | |
|------------------------|---|--------------|---|
| ACGIH | American Conference of Governmental Industrial Hygienists | NIF | No Information Found |
| BEIs | Biological Exposure Indices | NIOSH | National Institute for Occupational Safety and Health |
| CAS | Chemical Abstracts Service | NTP | National Toxicology Program |
| CERCLA | Comprehensive Environmental Response, Compensation, and Liability Act | ORC | Organization Resources Counselors |
| CFR | Code of Federal Regulations | OSHA | Occupational Safety and Health Administration |
| CNS | Central Nervous System | PEL | Permissible Exposure Limit |
| GI, GIT | Gastro-Intestinal, Gastro-Intestinal Tract | PNOR | Particulate Not Otherwise Regulated |
| HMIS | Hazardous Materials Identification System | PNOC | Particulate Not Otherwise Classified |
| IARC | International Agency for Research on Cancer | PPE | Personal Protective Equipment |
| LC50 | Median Lethal Concentration | ppm | parts per million |
| LD50 | Median Lethal Dose | RCRA | Resource Conservation and Recovery Act |
| LD_{Lo} | Lowest Dose to have killed animals or humans | RTECS | Registry of Toxic Effects of Chemical Substances |
| LEL | Lower Explosive Limit | SARA | Superfund Amendment and Reauthorization Act |



Specialty Steel

Safety Data Sheet (SDS)

Rev. 7/15/16

Section 16 - Other Information (continued)

ABBREVIATIONS/ACRONYMS (continued):

| | | | |
|-------------------------|--|-------------|------------------------------------|
| LOEL | Lowest Observed Effect Level | SCBA | Self-contained Breathing Apparatus |
| LOAEC | Lowest Observable Adverse Effect Concentration | SDS | Safety Data Sheet |
| µg/m³ | microgram per cubic meter of air | STEL | Short-term Exposure Limit |
| mg/m³ | milligram per cubic meter of air | TLV | Threshold Limit Value |
| mppcf | million particles per cubic foot | TWA | Time-weighted Average |
| MSHA | Mine Safety and Health Administration | UEL | Upper Explosive Limit |
| NFPA | National Fire Protection Association | | |

Disclaimer: This information is taken from sources or based upon data believed to be reliable. However, Universal Stainless & Alloy Products, Inc. makes no warranty as to the absolute correctness or sufficiency of any of the foregoing or that additional or other measures may not be required under particular conditions.

This SDS covers the following grades of Specialty Steels:

| Grade Group | Grades |
|-------------------------|--|
| Austenitic | 302, 303, 303SE, 304/304L, 309/309S, 310/310S, 316/316L, 317L, 321, 347, 2205, F11, F51, F9, F91, 2304 |
| Ferrite & Martensitic | 403Cb, 403/410, 410CB, 405, 416, 418 (Greek Ascoloy), 420, 420F, 422, 430, 430F, 431, 440A, 440C, 440FSE, 446, H46, FV535, Jethete, 13-5-2 |
| Precipitation Hardening | 15-5, 16-5, 16-6, 17-4, 17-7, 450 |
| High Temp | 330, 330Cb, A-286 |
| CrNiMn | N32 (XM-28), N33 (XM-29), N40 (21-6-9), N50 (XM-19), N60 (UNS 21800) |
| Low Alloy (VAR) | 300M, 4330, 4340, 4620, 52-100, 6150, 9310, HP9430, D6AC, Nitriding 135, Nitrating N, HyTuf, 300M |
| Premium VIM Melt | 13-8, 316/316L, 4340, 4343, 625, 718, 925, 9310, A286, X53, Alloy 100, Alloy 455, Maraging 250, Maraging 300, M50, M50NiL, CRV |
| Tool Steel | A2, A6, A9, Chipper, D2, H11, H13, L6, M2, M50, O1, O6, S5, S7 |